CLAIMS

Therefore, having thus described the invention, at least the following is claimed:

1. A transceiver, comprising:

means for receiving a locally generated transmit signal;

means for coupling the locally generated transmit signal to a communication medium, the means for coupling further coupled to a remotely generated receive signal; and

means for recovering the remotely generated receive signal configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the reduction of transmit signal echo is realized in a hybrid echo canceller.

2. The transceiver of claim 1, wherein the means for recovering comprises a multi-stage digital filter.

3. The transceiver of claim 2, further comprising:

means for determining the length in taps of the digital filter required to reduce the short-term echo components; and

means for bifurcating the multi-stage digital filter responsive to the determination means.

4. The transceiver of claim 2, wherein the multi-stage digital filter comprises a dual-stage finite impulse response (FIR) filter.

5. The transceiver of claim 2, wherein the multi-stage digital filter comprises a first stage that applies coefficients derived for each tap of the first stage and a second stage that derives coefficient values for a subset of the taps of the second stage.

6. The transceiver of claim 5, wherein the second stage applies a coefficient value to each tap.

7. The transceiver of claim 5, wherein the second stage derives coefficient values for each K^{th} tap.

8. The transceiver of claim 7, wherein the second stage uses an interpolation scheme to determine coefficients to apply at each of the taps disposed between taps associated with a derived coefficient.

9. The transceiver of claim 8, wherein the second stage applies a coefficient value at taps disposed between derived coefficients as a function of a coefficient value for the last derived coefficient.

10. The transceiver of claim 9, wherein the second stage applies the same coefficient value at taps disposed between derived coefficients as the coefficient value for the last derived coefficient.

11. A method for reducing transmit signal echo in a digital transceiver, comprising:

bifurcating a digital filter in response to the conversion rate of the filter tap coefficients;

adaptively calculating and applying a filter tap coefficient to each tap of a first stage of the bifurcated digital filter;

adaptively calculating a subset of the filter tap coefficients of filter taps in the second stage of the bifurcated filter; and

applying an interpolation technique to identify the remaining set of filter tap coefficients of the second stage.

12. The method of claim 11, wherein the step of bifurcating the digital filter is responsive to a digital subscriber line data transmission standard.

13. The method of claim 11, wherein the step of adaptively calculating a subset of filter tap coefficients determines a filter tap coefficient for the first tap of the second stage of the bifurcated filter and every K^{th} tap thereafter.

14. The method of claim 11, wherein the step of applying an interpolation technique comprises determining a filter tap coefficient for each filter tap disposed between calculated filter tap coefficients.

15. The method of claim 13, wherein the second stage applies a coefficient value at taps disposed between adjacent adaptively calculated coefficients as a function of the coefficient value associated with an earlier encountered tap.

16. The method of claim 13, wherein the second stage applies the same coefficient value at taps disposed between adaptively calculated coefficients as the coefficient value associated with an earlier encountered tap with a calculated coefficient.

17. A digital signal transceiver, comprising:

a transmitter configured to receive a locally generated transmit signal;

a hybrid electrically coupled to the transmitter configured to receive and inductively couple the transmit signal to a two-wire transmission line, the hybrid further configured to receive a remotely generated receive signal along the two-wire transmission line;

a receiver configured to process the remotely generated receive signal; and

an echo canceller disposed in parallel between the transmitter and the receiver configured to reduce both short-term echo components and long-tail echo components of the locally generated transmit signal wherein the echo canceller calculates coefficient values for less than N taps while emulating a N tap digital filter.

18. The transceiver of claim 17, wherein the echo canceller comprises a bifurcated digital filter that adaptively calculates and applies tap coefficients to each of a plurality of filter taps in a first stage and adaptively calculates and applies a subset of tap coefficient values to a plurality of filter taps in a second stage.

19. The transceiver of claim 18, wherein the digital filter adaptively calculates a tap coefficient value for a first tap of the second stage and every K^{th} tap thereafter.

20. The transceiver of claim 19, wherein the digital filter interpolates the calculated tap coefficient values for the second stage to identify coefficient values to apply at taps disposed between taps associated with a calculated tap coefficient.

21. A method for reducing transmit signal echo in a digital transceiver, comprising:

means for bifurcating a digital filter in response to the conversion rate of the filter tap coefficients;

means for deriving and applying a filter tap coefficient to each tap of a first stage of the digital filter;

means for adapting a subset of coefficients each associated with a particular filter tap in the second stage of the filter, the subset of coefficients comprising less coefficients than the number of filter taps in the second stage of the filter; and

means for interpolating at least one coefficient value intended for application at a filter tap not associated with an adapted coefficient of the second stage of the filter.

22. The method of claim 21, wherein the means for bifurcating is responsive to a digital subscriber line data transmission standard.

23. The method of claim 21, wherein the means for adapting a subset of coefficients determines a filter tap coefficient for a first tap of the second stage of the bifurcated filter and every K^{th} tap thereafter.

24. The method of claim 21, wherein the means for interpolating comprises determining a filter tap coefficient for each filter tap disposed between adapted filter tap coefficients.

25. The method of claim 23, wherein the second stage of the filter applies a coefficient value at filter taps disposed between K^{th} adapted filter taps as a function of the coefficient value associated with an earlier encountered tap.

26. The method of claim 23, wherein the second stage of the filter applies the same coefficient value at taps disposed between K^{th} adapted filter taps as the coefficient value associated with an earlier encountered tap with an adapted coefficient.